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TECHNOLOGY PARAMETERS OF SOIL WATER REGIME REGULATION WHEN FUNCTIONING DRAINAGE SYSTEMS OF THE LEFT-BANK FOREST-STEP

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Abstract. *The results of research on determining the technological parameters of regulating the soil water regime when functioning drainage systems (drainage and irrigation system "Romen", local contour water-accumulating systems – CWAS) of the Left-Bank Forest-Steppe are presented. Priority crops on drained lands (Sumy region) are corn for grain (share in the sown area 35%), sunflower (20%), wheat (16%), soybean (14%) and rapeseed (4%). Weather conditions on research and production plots (State Enterprise "Nadiya" and LLC Agrofirma "Lan") during the growing season 2022–2025 were characterized by extremely uneven distribution of precipitation and significant fluctuations in air temperature. The average hydrothermal coefficient (AHC) during the growing season in 2000–2025 varied within 0,6–1,9, in 2025 it was 0,77 (the conditions of a moderately arid zone). Technological parameters for regulating the soil water regime when cultivating corn for grain, buckwheat, winter wheat, sunflower, soybeans and perennial grasses were obtained, the applying of which ensures an increase in the yield of economically attractive crops up to 25%. During long-term operation (more than 30 years) of the CWASs, the effectiveness of their functioning was confirmed, as well as the possibility of ensuring a favorable soil water regime in areas with developed microrelief, obtaining a stable crop yield and increasing the efficiency of agricultural land use in the areas with micro-depression landforms. The increase in winter wheat yield by 12% compared to the watershed and by 64% compared to micro-depressions without ameliorative measures was observed. Technological parameters for regulating the soil water regime are recommended for use by specialists in agriculture and water management (landowners and land users of drained lands, operational and project water management organizations) when governing the water regime on drained lands of the Left-Bank Forest-Steppe.*

Keywords: *drainage and irrigation system, contour water-accumulating system, drained lands, technological parameters, soil water regime regulation*

The relevance of the study is due to the need to solve modern problems of regulating the soil water regime on drained lands to ensure the sustainability of agricultural production in unstable weather conditions. Climate change, which is observed in the zone of excessive moisture, in particular the Left Bank Forest-Steppe, is accompanied by inefficient accumulation of moisture in the soil, unstable moisture supply and the formation of new conditions for growing crops on drained lands [1, 2, 3]. In such conditions, the importance of agricultural lands with a regulated water regime increases. At the same time, climate change forms not only new conditions for agricultural production on drained lands, but also changes the structure of sown areas due to the shift of crop growing areas [4]. Therefore, given the conditions of modern management on agricultural lands with a regulated water regime, the tasks of effectively using the existing potential and water-regulating capacity of drainage systems as well as developing technological parameters for regulating the soil water regime for growing priority crops on drained lands of the Left Bank Forest-Steppe are relevant.

Analysis of recent research and publications shows that scientists generally pay attention to studying the impact of climate change on modern agricultural production, while a small number of works are devoted to the development of prospects for the effective use of drained lands and regulation of the soil water regime for growing crops, which are currently priority and economically attractive in the Left-Bank Forest-Steppe zone [1, 4–6].

It is noted in literary sources that agricultural production in the Left-Bank Forest-Steppe zone is territorially carried out under different soil and climatic conditions [5, 7]. At the same time, the use of agricultural lands in this region, in particular in Sumy, Kyiv and Chernihiv regions, is closely related to drainage land reclamation. As for regional features, in turn, Sumy region, in terms of heat and moisture supply, is located within two natural zones (mixed forest and forest-steppe) with three territorial parts distinguished by the moisture index [7, 8].

Recent studies show that due to the instability of weather conditions and low regulation of water resources, the active soil layer is constantly overdried or overwetted precisely during the period of active vegetation of cultivated crops, which is the cause of a significant decrease in yield. Therefore, studies aimed at obtaining technological parameters for regulating the soil water regime on agricultural lands are of great importance [9–15].

An analysis of publications has shown that in recent years a small number of scientific developments have been devoted to the problem of regulating the soil water regime during modern agricultural use of drained lands of the Left-Bank Forest-Steppe. In particular, technological parameters for water regulation for growing highly productive fodder crops (Japanese millet, amaranth and fodder beans) on lands with a regulated water regime have been obtained [16–19].

The scientific works also raise the issues of the feasibility of implementing irrigation systems for growing vegetable crops in the Left-Bank Forest-Steppe zone, the assessment of natural resources and their compliance with the crop requirements, possible ways to optimize external factors, with an emphasis on the modern problem of providing sufficient water resources, the volumes of which can be regulated by irrigation [20, 21].

Therefore, to obtain stable yields of priority and economically attractive crops in conditions of increasing instability of weather conditions and the need to solve the problems of modern agricultural production regarding the management of the soil water regime on drained lands of the Left-Bank Forest-Steppe zone, it is relevant to solve the problems of effective use of the potential of drainage systems and obtaining justified technological parameters for regulating the soil water regime on drained lands.

The purpose of the research is to determine the technological parameters of soil water regime regulation under the conditions of drainage systems functioning and modern management on drained lands of the Left-Bank Forest-Steppe.

The main objectives of the scientific research are to conduct analytical studies of modern agricultural use of drained lands, analyze experimental studies on determining the parameters of the soil water regime and substantiate the technological parameters of soil water regime regulation under modern management on drained lands of the Left-Bank Forest-Steppe.

Materials and methods of research. Research work was carried out on the lands with regulated soil water regime (drainage and irrigation system (DIS) “Romen”) and in the territories with non-drainage micro-depressions (“saucers”), which are under operation of local contour-water accumulation systems, which provide collection, accumulation, and redistribution of local runoff with its reuse for moistening cultivated crops. Experimental and production plots are located within the lands of SE “Nadiya” and LLC “Agrofirma “Lan” (Romensky district, Sumy region).

On the drained lands of SE “Nadiya”, regulation of soil water regime is carried out by subsoil moistening. Micro-depressions (“saucers”) are located on the experimental and production sites of Agrofirma “Lan” LLC, where contour water-accumulating systems (CWAS) were built in 1995, Fig. 1. The main structural element of the CWAS is drainless contour water-accumulating trenches with various filtering back fillings (straw, peat, fascines), which provide accumulating excess water within the micro-depressions.

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Fig. 1. Layout of the CWAS, Agrofirma "Lan" LLC:
1 – CWAS 1 (straw filtering back filling), 2 – CWAS 2 (straw filtering back filling), 3 – CWAS 3 (peat filtering back filling), 4 – CWAS 4 (fascia filtering back filling), 5 – micro-depression without ameliorative measures

During the research certified and standardized in Ukraine methods, as well as methodological approaches used in domestic and international practice were used. The available equipment was following: disc drill, crackers, electronic laboratory scales, drying oven, thermometers, rain gauge.

The basis of the research methodology is a systematic analysis and generalization of experimental field materials regarding meteorological indicators (air temperature and precipitation), groundwater level (GWL), soil humidity and moisture reserves, biometric indicators of cultivated crops obtained in the period 2022–2025 under production conditions.

Determination and justification of technological parameters for regulating soil water regime during the cultivation of corn for grain, buckwheat, winter wheat, sunflower, soybeans and perennial grasses is based on specifying optimal ranges of groundwater level, soil humidity and moisture reserves, which ensure maximum growth of biometric indicators, in particular linear growth, leaf area, dry mass accumulation and yield of the above-mentioned crops by development phases, as well as during critical periods of their moisture supply, against the background of various methods of regulating soil water regime, in particular, sluicing (groundwater level regulation options – absolute drainage, closed potter's drainage, open channel network) and using local contour water-accumulating systems with various filtering back fillings.

Sowing and monitoring of crops were carried out according to generally accepted technologies for their cultivation when using mechanisms and tools directly used in production conditions. Harvest accounting was carried out using a continuous method from the entire accounting area.

On the drained lands of the SE "Nadiya" (mineral soils), corn for grain (hybrid DK315, FAO 310) was grown on the area of 1,5 hectares and buckwheat (variety "Slobozhanka") on the area of 28 hectares (mineral soils) in 2022. Mineral fertilizers were applied: for corn – at the rate of $N_{60}P_{60}K_{60}$ and for buckwheat – $N_{30}P_{30}K_{30}$. In 2023, winter wheat (variety "Bogdana") was grown on the area of 14 hectares; corn for grain (hybrid DN Pyvykha, FAO 180) on the area of 6 hectares and sunflower (hybrid P62LL109) on an area of 19 hectares. In 2025, sunflower (variety P62LL109) was sown by the SE Nadiya on the area of 20 hectares. Mineral fertilizers were applied in two versions – $N_{30}P_{30}K_{30}$ and $N_{60}P_{90}K_{60}$. On peat soils in the period 2022–2025, the crop grown was perennial grasses.

In 2024, soybeans (variety "Yug 30") were sown on the lands of LLC "Agrofirma "Lan" (mineral soils). Mineral fertilizers were applied at the rate of $N_{12}P_{24}K_{12}$. In 2025, winter wheat (variety NEXT) was grown; fertilizers were applied at the rate of $N_{12}P_{24}K_{12}$ in autumn period and KAS-32 in the spring period.

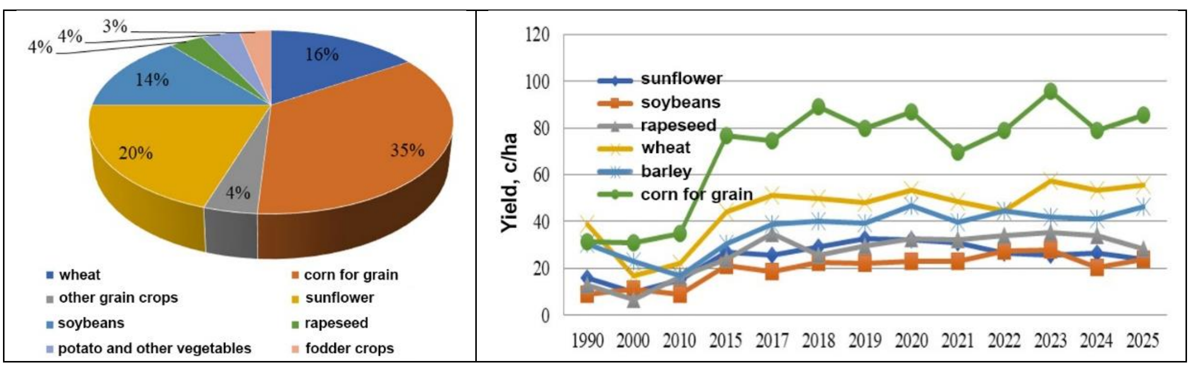
Research results and their discussion. According to the tasks set, analytical studies on the modern agricultural use of drained lands of the Left Bank Forest-Steppe were carried out. It was specified (using the example of Sumy region) that in 2025 the priority crops on drained lands were corn for grain (share in the sown area is 35%), sunflower (20%), wheat (16%), soybeans (14%) and rapeseed (4%), Fig. 2, a. Sowings of industrial crops over the past 35 years have increased due to the expansion of sunflower areas (from 16,8 thousand ha to 199,2 thousand ha or by 11,9 times), soybeans (from 1,3 thousand ha to 136 thousand ha or by 104,6 times) and rapeseed (from 7,8 thousand ha to 35,7 thousand ha or by 4,5 times). The area under sugar beet decreased by almost 239 times, and the yield increased almost twice. In the period 1990–2025, an increase in yield for almost all priority crops was observed (Fig. 2, b).

Experimental studies were conducted to determine the parameters of meteorological factors, rates of the groundwater level (GWL) and the water regime (moisture and moisture reserves) of the soil.

During the growing season of 2025, 256,5 mm of precipitation fell, which is 64,4 mm less than the average long-term values. Precipitation was distributed extremely unevenly both during the growing season and during individual months. The average daily air temperature during the growing season was 15,5 °C, which is 0,7 °C less than the average long-term values. The hydrothermal coefficient (HTC) of the territory of the experimental and production sites (within the lands of the SE "Nadiya" and LLC "Agrofirma "Lan") in 2000–2025 was determined, Fig. 3. The average HTC values for the growing season in the specified period varied widely – from 0,6 to 1,9. In 2025, the HTC was 0,77, which corresponds to the conditions of a moderately arid zone (for an arid zone the HTC is 1,0–0,7).

A study of the dynamics of the GWL and the moisture content of the active soil layer during the growing season 2022–2025 was conducted.

In 2025, at the experimental site of LLC "Agrofirma "Lan" with CWAS № 3 (the filtering back filling is peat), where winter wheat was grown, the GWL in the area with micro-depression without ameliorative measures at the beginning of the growing season was within 20–40 cm, and the root zone was periodically flooded, Fig. 4, a.



a) b)

Fig. 2. Disposition of crops in 2025 (a) and yield of basic crops in 1990–2025 (b), Sumy region

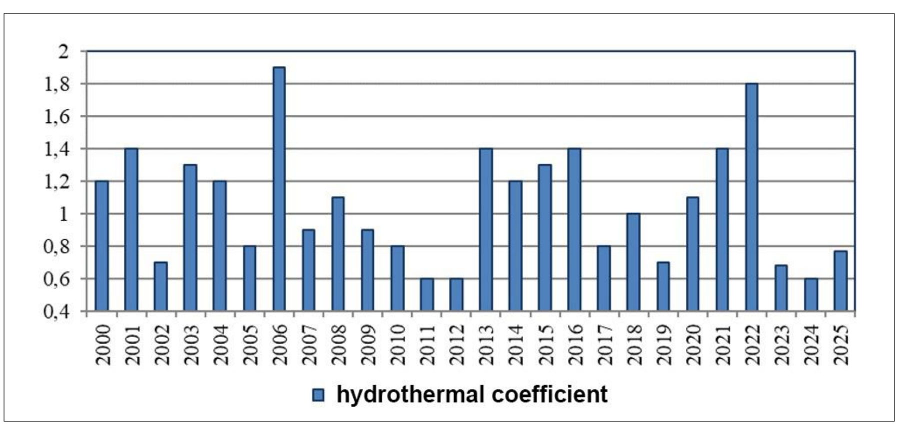


Fig. 3. Hydrothermal coefficient in the period 2000–2025, DIS "Romen"

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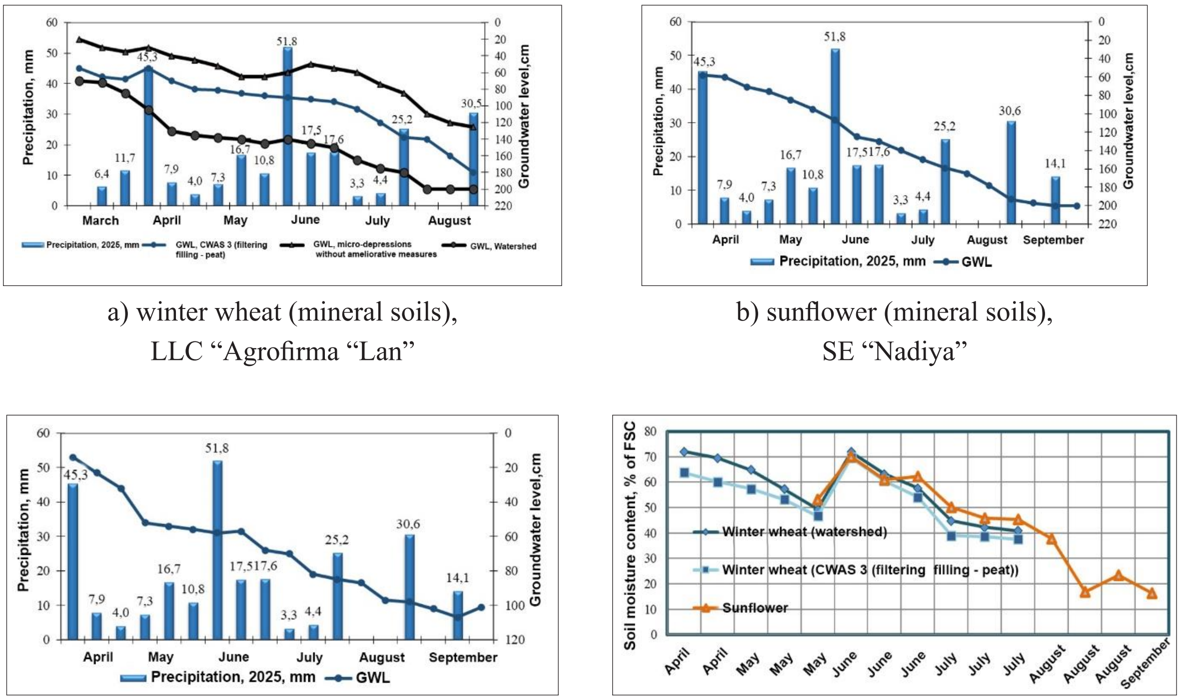

a) winter wheat (mineral soils), LLC "Agrofirma "Lan"

b) sunflower (mineral soils), SE "Nadiya"

c) perennial grasses (peat soils), SE "Nadiya"

d) winter wheat (mineral soils, LLC "Agrofirma "Lan", CWAS № 3) and sunflower (mineral soils, SE "Nadiya")

Fig. 4. Precipitation, dynamics of GWL (a, b, c) and moisture in the soil layer 0–50 cm (d), 2025.

On mineral soils where sunflower was grown (SE "Nadiya"), the GWL in the spring period was at a depth of 55–100 cm, in the summer period at the depth 100–175 cm, and in the autumn period it decreased to 180 cm. The formation of moisture and moisture reserves of the active soil layer depended on the arrival of atmospheric precipitation, Fig. 4, b and d.

On peat soils where perennial grasses were grown (SE "Nadiya"), the actual GWL in April was at a depth 25–45 cm, during the first mowing period it was at a depth of 55–60 cm, and during the second mowing period it was at the depth 90–100 cm, Fig. 4, c.

The dynamics of soil moisture during the cultivation of winter wheat on the lands of LLC Agrofirma "Lan" (CWAS № 3) and sunflower (SE "Nadiya") is shown in Fig. 4, d. Moisture reserves in the soil layer 0-50 cm during the cultivation of winter wheat were: in April – 160–170 mm, in May – 120–150 mm, in June – 120–170 mm, in July – 90–100 mm; during the cultivation of sunflower: in May – 105–110 mm, in June – 140–150 mm, in July – 100–110 mm, in August – 80–100.

According to the tasks set, an analysis of the results of experimental studies on the dynamics of growth and accumulation of dry mass of corn for grain, buckwheat, winter wheat, sunflower, and soybeans was performed in 2022–2025 by the phases of their development; critical periods of their moisture supply were determined.

During the cultivation of corn for grain, it was observed its slow development at the beginning of the growing season (second half of May). The most intensive linear growth of vegetative mass was recorded from 20.06 to 20.07, and by the end of the growing season the plants reached a maximum height of 2,45–2,70 m.

Buckwheat developed slowly in the first half of June, and from 20.06 to the end of July, intensive linear growth of vegetative mass was recorded. By the end of the growing season the plants reached a height of 0,90–1,05 m.

The intensity of the growth of corn leaf surface tended to decrease in May due to low air temperatures. In general, the growth of corn and buckwheat leaf surface depended on fertilizer application. The maximum values of the assimilation surface of corn were recorded on the 40th–50th day after emergence; the most intensive increase in leaf surface was from July 10 to August 20.

To determine critical periods of moisture supply for winter wheat, the results of studies on the accumulation of its dry mass were used, Fig. 5. Winter wheat was grown on drained lands of the "Romen" drainage and irrigation system and in

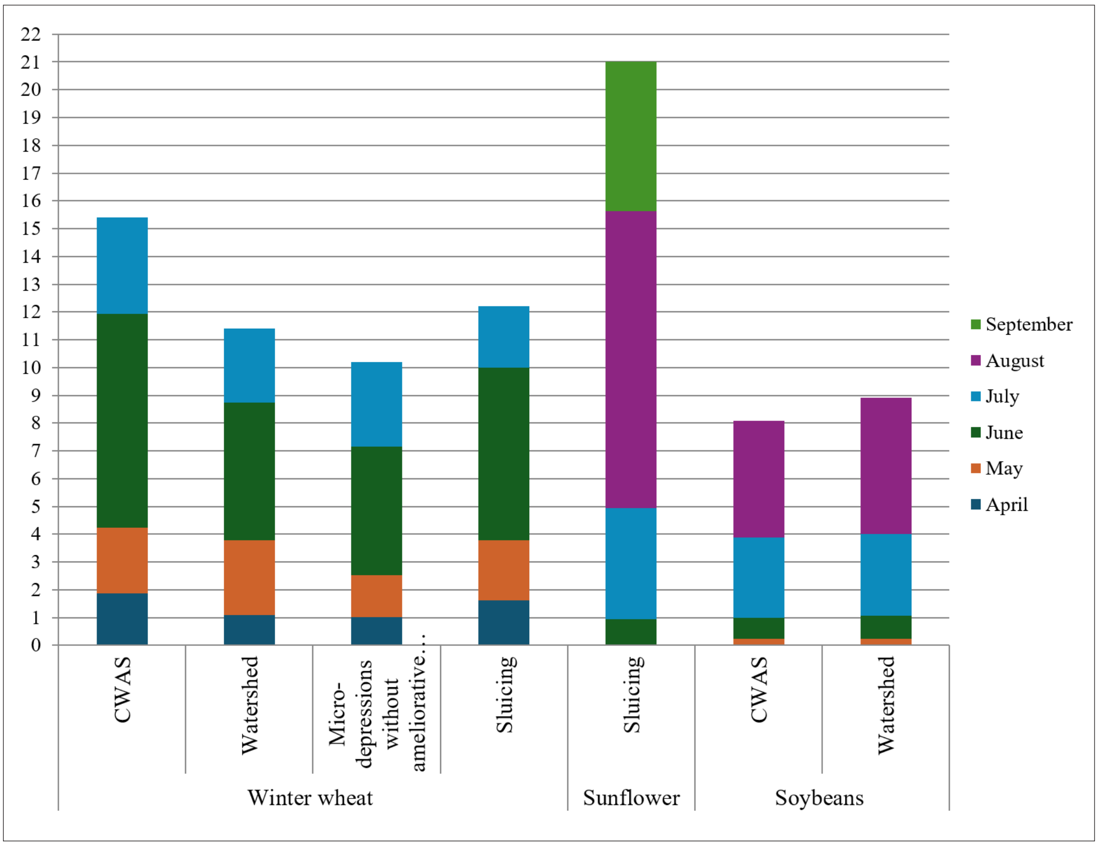

Fig. 5. Dynamics of dry mass growth of winter wheat, sunflower and soybeans when regulating the soil water regime, t/ha

the areas with micro-depressions, where CWAS were built. On the experimental and production plots of the DIS "Romen", the most significant increase in the dry mass of winter wheat was observed in June (the maximum was recorded in the 3rd decade); on the plots with CWAS – also in June, however, the maximums were recorded in the 3rd decade of June and the 1st decade of July.

It was specified that the operation of the CWAS provides a stable and fairly uniform increase in the dry mass of winter wheat, as well as when regulating the soil water regime by sluicing (DIS "Romen"). In the areas without regulation of soil water regime, the increase in the dry mass of winter wheat by decades has a jump-like character, which indicates a significant dependence of crop development on the distribution of precipitation during the growing season.

When growing sunflower, the maximum accumulation of its dry mass is observed in August (the largest increase was in the 3rd decade), while the 1st decade of September is also characterized by high growth rates.

As for soybeans, which were grown in areas of CWAS operation, the monthly maximum was recorded in August (seed ripening phase). Maxima of growth were recorded in all ten days of August and the second ten days of July.

Based on the systematic analysis and generalization of the materials of the experimental studies on the onset of development phases, growth dynamics, accumulation of dry mass of the studied crops, dynamics of groundwater level, soil humidity and moisture reserves, justified technological parameters of regulation of soil water regime for cultivation of corn for grain, buckwheat, winter wheat, sunflower, soybeans and perennial grasses were obtained, Tables 1 and 2.

The yield of corn for grain and buckwheat was determined when regulating soil water regime on the drained lands of the DIS "Romen", which was 7,1 t/ha and 1,4 t/ha, respectively, and when applying fertilizers it was 9,8 t/ha and 1,8 t/ha respectively. Mineral fertilizers were applied at the rate of $N_{30}P_{30}K_{30}$ (for buckwheat) and $N_{60}P_{60}K_{60}$ (for corn for grain), which contributed to an increase in their yield by 26% and 38%, respectively. The yield of winter wheat when regulating water regime was 4 t/ha, and when applying fertilizers $N_{60}P_{60}K_{60}$, the increase in yield was up to 50%.

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1. Technological parameters for regulating soil water regime during the cultivation of corn for grain, buckwheat, winter wheat, sunflower and soybeans on drained lands of the Left Bank Forest-Steppe (DIS "Romen")

№	Indicator	Crop					
		Corn for grain	**Buckwheat**	**Winter wheat**		**Sunflower**	**Soybeans**
1	Critical period of moisture supply	3[d] ten-day period of June – 2[d] ten-day period of July	2[d] ten-day period of June – 3[d] ten-day period of July	1[st] ten-day period of June – 1[st] ten-day period of July		1[st] ten-day period of August – 1[st] ten-day period of September	1[st] ten-day period of July – 3d ten-day period of August
2	Sowing date	14.05	02.06	20.09–06.10		24.05–26.05	27.05
3	Sprouting of crops	3d ten-day period of May	1[st] ten-day period of June	03–17.10		1[st] ten-day period of June	1[st] ten-day period of June
	GWL, cm	45–75	70–80	–		90–95	80–90
	Moisture content, % FMC	40–45	40–50	–		45–65	70–80
	Moisture reserves in a layer of 50 cm, mm	110–120	80–90	–		90–120	250–280
4	The beginning of the period of intensive growth of vegetative mass	2d ten-day period of June	2d ten-day period of June	beginning of June contour water-accumulation systems	sluicing	beginning of August	beginning of July contour water-accumulation systems
	GWL, cm	50–60	100–110		100–110	110–120	140–150
	Moisture content, % FMC	45–70	60–75	55–60	35–55	40–55	45–65
	Moisture reserves in a layer of 50 cm, mm	90–130	70–85	130–135	110–120	90–110	190–220
5	Period of maximum growth of vegetative mass	end of June – 2d ten-day period of July	July	June		August	August
	GWL, cm	80–120	110–120		100–130	130–140	150–170
	Moisture content, % FMC	35–50	35–40	55–70	45–65	30–40	30–40
	Moisture reserves in a layer of 50 cm, mm	70–90	70–80	120–130	90–120	60–80	70–90
6	Period of grain ripening	end of September	end of August – beginning of September	end of July		first part of October	end of August
	GWL, cm	100–120	110–130		120–130	–	–
	Moisture content, % FMC	15–30	30–40	40–45	40–45	–	20–40
	Moisture reserves in a layer of 50 cm, mm	60–80	50–65	80–100	80–100	–	50–60

2. Technological parameters for regulating soil water regime and yield of perennial grasses on drained lands of the Left Bank Forest-Steppe (DIS "Romen")

Crop	**Years of research**			
Perennial grasses	2022–2025			
Harvesting (mowing 1)	10–12.06			
Harvesting (mowing 2)	02–17.08			
Month	May	June	July	August
Soil moisture, % of FMC	90–95	80–85	65–80	60–70
Soil moisture reserves, mm	170–250	260–350	300–350	250–300
GWL, m	0.35–0.45	0.50–0.60	0.70–0.80	0.80–0.90
Options for regulating GWL	level drainage with moistening	open canals with moistening		closed pot drainage without moistening
Soils	peat			
Yield (mowing 1, without fertilizes), t/ha	21–28	20–26		19–23
Yield (mowing 1, $N_{30}P_{60}K_{90}$), t/ha	27–35	23–31		22–28
Yield (mowing 2, without fertilizers), t/ha	15–18	15–17		12–15
Yield (mowing 2, $N_{30}P_{60}K_{90}$), t/ha	18–27	17–25		15–24

The yield of sunflower when regulating water regime was 2,3 t/ha, and when applying of $N_{60}P90K_{60}$ fertilizers it was 3,2 t/ha; the yield increase reached 26%.

It was specified that the increase in the yield of corn for grain, buckwheat, winter wheat and sunflower when regulating soil water regime and applying fertilizers on the drained lands of the DIS "Romen" and SE "Nadiya", was 23%, 19%, 25% and 28%, respectively, compared to the average yield of the above-mentioned crops on this farm.

Harvesting of perennial grasses when applying 3 options for regulating soil water regime (level drainage with moistening, open canals with moistening, closed pot drainage without moistening), was carried out in the following terms: 1st mowing – 10.06–12.06, and 2nd mowing – 02.08–17.08. The highest yield of perennial grasses was obtained in the variant with level drainage with moistening: for 1st mowing – 21–28 t/ha, 2nd mowing – 15–18 t/ha, and when applying fertilizers at the rate of $N_{30}P_{60}K_{90}$ the yield was increased by 27%.

The yield of soybeans and winter wheat by the variants of the study (for CWAS with different back fillings) is presented in Tables 3 and 4. The average soybean yield was 2.6 t/ha, while in areas with micro-depressions without ameliorative measures, soybean crops were damped off.

The yield of winter wheat by the experimental variants (for CWAS with different back fillings) was on average 4,75 t/ha, and in the areas with micro-depressions without ameliorative measures it was 1,7 t/ha, on the watershed – 4,2 t/ha.

It should be noted that the obtained scientific and practical results are a supplement to the data on water regulation parameters previously obtained by the authors, in particular when cultivating highly productive fodder crops on drained lands, and their significance is confirmed by a number of problems that can be solved when using them, in particular, it refers to increasing the efficiency of using agricultural lands with micro-depression landforms, where local contour water-accumulation systems (CWAS) were arranged. At the same time, further studies will take into account the fact that due to the increased sensitivity of new crops to the soil water regime in the active phases of their vegetation, its operational correction is periodically necessary, the justification of which is possible only on the basis of engineering calculation methods based on modern mathematical models of saturated-unsaturated groundwater flows.

Conclusions. By the results of research on the modern agricultural use of drained lands of the Left-Bank Forest-Steppe, it was specified that the priority crops on drained lands are currently corn for grain (share in the sown area 35%), sunflower (20%), wheat (16%), soybeans (14%) and rapeseed (4%).

Based on experimental research of the meteorological factors and a hydrothermal coefficient (HTC) of the area of the experimental and production sites (within the land use of the SE "Nadiya" and LLC "Agrofirma "Lan"), it was determined that the weather conditions in the growing season 2022–2025 were characterized

3. Soybeans yield by the CWAS options, 2024

№	Experiment variant	Yield, t/ha			Average, t/ha
		Repeatability			
		I	II	III	
1	CWAS 1 (filtering filling – straw)	2.4	2.5	2.2	2.4
2	CWAS 2 (filtering filling – straw)	2.3	2.7	2.8	2.6
3	CWAS 3 (filtering filling – peat)	2.8	2.5	2.9	2.7
4	CWAS 4 (filtering filling – fascines)	2.3	2.5	2.7	2.5
5	Micro-depressions without ameliorative measures	–	–	–	–
6	Watershed	2.6	2.5	2.8	2.6

4. Yield of winter wheat by the CWAS options, 2025

№	Experiment variant	GWL, cm	Yield, t/ha			Average, t/ha
			Repeatability			
			I	II	III	
1	Watershed	70–180	4.5	4.2	4	4.2
2	CWAS 1 (filtering filling – straw)	40–115	4.5	3.7	3.9	4.0
3	CWAS 2 (filtering filling – straw)	35–125	4.7	4.6	4.3	4.5
4	CWAS 3 (filtering filling – peat)	55–140	5.4	4.9	5.6	5.3
5	CWAS 4 (filtering filling – fascines)	40–140	5.1	4.8	5.7	5.2
6	Micro-depressions without ameliorative measures	20–80	1.5	1.9	1.8	1.7

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by an extremely uneven distribution of precipitation and significant fluctuations in air temperature, and the average HTC coefficient for the growing season in 2000–2025 varied in a wide range – from 0,6 to 1,9. In particular, in 2025, HTC was 0,77, which corresponds to the conditions of a moderately arid zone.

Based on the systematic analysis and generalization of the materials of experimental research on the onset of development phases, growth dynamics, accumulation of dry mass of the studied crops, the results of the analysis of the dynamics of groundwater levels, moisture and soil moisture reserves, justified technological parameters for regulating soil water regime for the cultivation of corn for grain, buckwheat, winter wheat, sunflower, soybeans and perennial grasses when functioning the drainage systems of the Left Bank Forest Steppe, were obtained. Their implementation will ensure an increase in the yield of economically attractive crops (corn for grain, buckwheat, winter wheat and sunflower) up to 25% on average.

It was specified that the effectiveness of the CWAS functioning was confirmed even under the condition of their long-term operation, therefore it makes possible to ensure a favorable soil water regime in areas with developed microrelief, to obtain a stable crop yield of cultivated crops and increase the efficiency of agricultural land use in areas with micro-depression landforms. The arrangement of the CWAS ensured an increase in winter wheat yield by 12% compared to the watershed and by 64% compared to micro-depressions without ameliorative measures [22].

Technological parameters for regulating soil water regime when growing crops on drained lands of the Left-Bank Forest-Steppe are recommended for use by the specialists in the field of agriculture and water management (landowners and land users of drained lands, as well as operational and project water management organizations) when controlling the moisture supply of crops grown on drained lands in the Left-Bank Forest-Steppe zone in the modern conditions of war and the post-war period.

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Use of artificial intelligence: the authors confirm that they did not use artificial intelligence technologies during the creation of this work.

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ТЕХНОЛОГІЧНІ ПАРАМЕТРИ РЕГУЛЮВАННЯ ВОДНОГО РЕЖИМУ ҐРУНТУ В УМОВАХ ФУНКЦІОНУВАННЯ ДРЕНАЖНИХ СИСТЕМ ЛІВОБЕРЕЖНОГО ЛІСОСТЕПУ

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Анотація. *Наведено результати досліджень щодо визначення технологічних параметрів регулювання водного режиму ґрунту в умовах функціонування дренажних систем (осушувально-зволожувальна система «Ромен», локальні контурно-водоакумулюючі системи – КВС) Лівобережного Лісостепу. Пріоритетними культурами на осушуваних землях (Сумська обл.) є кукурудза на зерно (частка у посівній площі 35 %), соняшник (20 %), пшениця (16 %), соя (14 %) та ріпак (4 %). Погодні умови у вегетаційний період 2022–2025 рр. (дослідно-виробничі ділянки, ДП «Надія» та ТОВ «Агрофірма «Лан») характеризувалися вкрай нерівномірним розподілом опадів та значним коливанням температурних показників повітря, середній у вегетаційний період показник гідротермічного коефіцієнта (ГТК) у 2000–2025 рр. змінювався у межах 0,6–1,9, у 2025 р. ГТК становив 0,77 (умови помірно посушливої зони). Отримано технологічні параметри регулювання водного режиму ґрунту за вирощування кукурудзи на зерно, гречки, озимої пшениці, соняшнику, сої та багаторічних трав, впровадження яких забезпечує підвищення врожайності економічно привабливих культур до 25 %. За тривалої експлуатації (більше 30 років) КВС підтверджена ефективність їх функціонування, можливість забезпечення сприятливого водного режиму грунту на територіях із розвиненим мікрорельєфом, отримання стабільного врожаю культур та підвищення ефективності використання сільськогосподарських земель на територіях із мікрозападинними формами рельєфу, відмічено зростання врожайності озимої пшениці на 12 % порівняно з водорозділом та на 64% порівняно з мікропониженнями без меліорації. Технологічні параметри регулювання водного режиму ґрунту рекомендовано для використання фахівцями в галузі сільського та водного господарства (землевласникам та землекористувачам осушуваних земель, експлуатаційним та проєктним водогосподарським організаціям) при управлінні водним режимом на осушуваних землях Лівобережного Лісостепу.*

Ключові слова: *осушувально-зволожувальна система, контурно-водоакумулююча система, осушувані землі, технологічні параметри, регулювання водного режиму ґрунту*